CRUISE RESULTS
NOAA Research Vessel ***PISCES***
Cruise No. PC 13-01
Winter Northeast Integrated Pelagic Survey

CRUISE PERIOD AND AREA

The NOAA research vessel *PISCES* sampled at a total of 120 stations from 10 to 26 February 2013. The cruise covered the continental shelf from north of Cape Hatteras, NC to the western half of Georges Bank and a portion of the Gulf of Maine in just sixteen days (Figure1).

OBJECTIVES

The principal objective of the survey was to assess the pelagic components of the Northeast U.S. Continental Shelf Ecosystem from water currents to plankton, pelagic fishes, marine mammals, sea turtles, and seabirds. Specifically the spatial distribution of the following parameters were quantified: water currents, water properties, phytoplankton, microzooplankton, mesozooplankton, pelagic fish and invertebrates, sea turtles, marine mammals, and sea birds. Traditional and novel techniques and instruments were used to achieve these goals. In essence, the approaches of the Ecosystem Monitoring survey and the Herring Acoustic survey were combined here and augmented to include a broad array of measurements of the pelagic ecosystem.

Operational objectives were to: (1) collect underway data using TSG, SCS, and ADCP; (2) complete CTD and bongo operations at stations throughout area, (3) calibrate the EK60 Scientific Sounder, (4) conduct acoustic surveys using the EK60 and ME70, (5) collect biological data to verify species-specific acoustic measurements using midwater trawls, (6) collect marine mammal and seabird observations, (7) conduct radiometry measurements during satellite overpasses to ground-truth the satellite data.

This survey was multidisciplinary and the first of its kind to be conducted in the Northeast region. As such, a secondary objective was to learn how to integrate these operations. The cruise plan evolved with input from scientists as well as the officers and crew of the *PISCES* as the cruise progressed. An extended post-cruise meeting focused on the lessons learned and improvements that could be made to future Integrated Pelagic Surveys.

METHODS

The survey consisted of 120 stations at which the vessel stopped to lower instruments over the starboard side of the vessel from an A-frame and conductive-wire winch (Figure 2).

Plankton and hydrographic sampling was conducted by making double oblique tows using the 61-cm bongo sampler and a Seabird CTD. The tows were made to approximately 5 meters above the bottom,

or to a maximum depth of 200 meters. All plankton tows were conducted at a ship speed of 1.5 – 2.0 knots. Plankton sampling gear consisted of a 61-centimeter diameter aluminum bongo frame with two 335-micron nylon mesh nets. At the randomly designated zoogen stations a 20-cm diameter PVC bongo frame fitted with paired 165-micron nylon mesh nets was put on the towing wire one half meter above the Seabird CTD with a wire stop. A similar PVC bongo frame fitted with two 335 micron mesh nets was used at the remaining plankton stations. A 45-kilogram bell-shaped lead weight was attached by a 20-centimeter length of 3/8-inch diameter chain below the aluminum bongo frame to depress the sampler. The flat bottomed configuration of the depressor weight made for safer deployment and retrieval of the sampling gear when the boat was rolling in rough seas. A digital flowmeter was suspended within the mouth of each sampler to determine the amount of water filtered by each net. No flowmeters were used in the 20-cm bongos. The plankton sampling gear was deployed off the starboard side of the vessel using an A-frame and a conducting cable winch. After retrieval the bongo nets were washed down on a table set up near the A-frame to obtain the plankton samples. The 61-centimeter bongo plankton samples were preserved in a 5% solution of formalin in seawater. The 20-cm bongo plankton samples were preserved in 95% ethanol, which was changed once 24 hours after the initial preservation. Tow depth was monitored in real time with a Seabird CTD profiler. The Seabird CTD profiler was hard-wired to the conductive towing cable, providing simultaneous depth, temperature, and salinity for each plankton tow. A CTD 911/Niskin bottle rosette sampler cast to within 5 meters of the bottom was made at all the fixed stations to obtain water samples for nutrient analysis, as well as profiles of water temperatures, salinities, and chlorophyll-a and oxygen levels. A fluoroprobe unit mounted on the array provided data as to the type of algae present throughout the water column based on the fluorescence observed at different wavelengths.

Zooplankton genetics (zoogen) samples were collected at 5 randomly designated stations in the Southern New England region, 8 in the Georges Bank region and 8 in the Gulf of Maine region, yielding a total of 21 samples using the 20-cm diameter bongo equipped with 165-micron mesh nets as described above for this program.

A 20-cm bongo sampler equipped with 335-micron mesh nets was used to collect 66 ichthyoplankton samples for larval fish and egg genetics from across the entire survey area.

Midwater trawling was conducted opportunistically based on observations from the acoustic returns on the EK60 system. Seven trawls were made, using a Polytron Midwater Rope Trawl whose depth was monitored in real-time using a Simrad FS70 third-wire Trawl Monitoring System. Michael Jech supervised the fishing of this net, which was towed at about 4 knots and deployed to capture fish based on the acoustic backscatter observed.

Continuous monitoring of the seawater salinity, temperature and chlorophyll-*a* level, from a depth of 3.7 meters along the entire cruise track was done by means of a thermosalinograph, and a flow-through fluorometer hooked up to the ship's scientific flow-through seawater system. The Scientific Computer System (SCS) recorded the output from both the thermosalinograph, and the fluorometer at 10-second intervals. The data records were given a time-date stamp by the GPS unit.

Scientific Computer System (SCS) and Fisheries Scientific Computer System (FSCS): The *PISCES'* SCS system is a PC-based server, which continuously collects and distributes scientific data from various navigational, oceanographic, meteorological, and sampling sensors throughout the cruise. The SCS EventLog program was configured for NEFSC Fisheries Acoustic Survey operations, and was used by the scientists to document all operational events (*e.g.*, begin and end of transects and deployments). Date and time for data collections from computers, instrumentation, and logsheet

recording were synchronized using the vessel's GPS master clock and Dimension IV software. The FSCS system was used for on-board data logging of the biological and catch data. The NEFSC set up the FSCS hardware and software, and the NEFSC and *PISCES*' Survey Technician and Electronics Technician were responsible for ensuring data collection and logging.

RESULTS

A summary of routine survey activities is presented in Table 1. Areal coverage for the cruise is shown in Figure 1. The NOAA vessel *PISCES* sailed on Sunday morning, 10 February 2013, from its berth at the Marine Operations Center - Atlantic (MOC-A) in Norfolk, VA, after being pinned down for a couple of days later than the initial 7 February sailing date by winter storm Nemo. The *PISCES* picked up the southernmost stations in the Mid-Atlantic Bight (MAB), and then proceeded to work its way north along the continental shelf during the first week of the survey, completing four midwater trawls, twenty three rosette casts, and forty seven bongo plankton tows in that time. Fifty one Styrofoam coffee cups, decorated by elementary school students at Fishing Cove School in North Kingstown, RI, were miniaturized at depth during several of the rosette casts for a demonstration of the compressive power of seawater (Figures 2 and 3). The midwater trawls caught a variety of small adult pelagic fish, juvenile fish and squid, (Figures 4 and 5), although the large net was slow to deploy, so fish schools seen on the EK60 were often largely missed, as the catches were very small. The NASA personnel on board were also able to conduct several hand-deployed radiometer casts during satellite overpasses in this portion of the cruise. Bad weather on Sunday morning, 16 February forced the vessel to seek shelter by anchoring just outside of Provincetown, MA. After leaving that anchorage the *PISCES* headed into the Gulf of Maine (GOM) where another fifteen stations were completed when another storm forced the vessel to dock in Portland, ME for a couple of days, before heading back out and sampling at more stations on Georges Bank and in the Southern New England (SNE) areas. A calibration of the EK60 acoustic system was conducted in Narragansett Bay where the PISCES anchored overnight to avoid a squall (Figure 6). The vessel left the Bay after the squall's passing for more SNE area sampling before returning to dock at Pier Two of the Naval Station in Newport, RI. on Tuesday, 26 February 2013, ending the cruise. At the subsequent post-cruise meeting one item mentioned for future improvement was the size of the mid-water trawl. A smaller net might be easier and faster to deploy opportunistically, allowing for a higher probability of catching targets seen on the EK60 returns, which turned out to problematic on this survey. Mike Jech resolved to have a smaller, faster to deploy mid-water trawl made for future pelagic surveys.

DISPOSITION OF SAMPLES AND DATA

All samples and associated data were delivered to the Ecosystem Monitoring Group of the NEFSC Narragansett, RI, for quality control processing and further analysis. The zooplankton genetics samples were delivered to Nancy Copley of the Woods Hole Oceanographic Institute. The nutrient samples were sent to Maura Thomas and Dave Townsend at the University of Maine in Orono, ME. The CTD data were delivered to the Oceanography Branch of the NEFSC, Woods Hole, MA. Radiometry data were taken by the NASA scientists to their facility in Greenbelt, MD..

SCIENTIFIC PERSONNEL

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Table 1. Summary of sample activities conducted at 120 stations at which the *PISCES* stopped to lower instruments over the side during Cruise No. PC 13-01. Latitude and Longitude are shown in decimal degrees. Std BON = 61 cm bongo Standard Protocol, CTD PROFILE 911 = fixed station, 2B3 = 333 mesh 20 cm bongo 2B1 = 165 mesh 20 cm bongo NUT = nutrient samples collected.

CTD Cast #	SiteID/STA#	Date GMT	Latitude (dd)	Longitude (dd)	Bottom Depth (meters)	Operation
1	1	10-Feb	36.9583	-75.8067	14.1	BON/CTD, 2B1
2	2	10-Feb	36.8017	-75.4583	20.1	BON/CTD, 2B3
3	3	10-Feb	36.6717	-75.4783	24.9	BON/CTD, 2B3
1	3	10-Feb	36.6683	-75.4817	25.7	CTD PROFILE 911, NUT
4	4	11-Feb	36.2783	-75.6383	22.3	BON/CTD, 2B3
5	5	11-Feb	36.0833	-75.545	24.1	BON/CTD, 2B3
2	6	11-Feb	36.0017	-75.4683	24	CTD PROFILE 911, NUT
3	7	11-Feb	36.0017	-75.1767	35	CTD PROFILE 911
6	8	11-Feb	35.9617	-75.1033	28.9	BON/CTD, 2B1
4	9	11-Feb	36.0017	-74.7767	377.5	CTD PROFILE 911, NUT
5	10	11-Feb	35.9983	-74.6667	1000	CTD PROFILE 911, NUT
7	11	11-Feb	36.22	-74.7317	646.5	BON/CTD, 2B1
8	12	11-Feb	37.1367	-74.82	57.1	BON/CTD, 2B3
6	12	11-Feb	37.14	-74.8183	58.2	CTD PROFILE 911, NUT
9	13	11-Feb	37.145	-75.485	23.9	BON/CTD, 2B3
10	15	11-Feb	37.5317	-75.2983	22.7	BON/CTD
8	15	11-Feb	37.53	-75.295	24.1	CTD PROFILE 911, NUT
11	16	11-Feb	37.5567	-75.165	27.5	BON/CTD, 2B3
9	17	12-Feb	37.7	-74.2633	110	CTD PROFILE 911, NUT
12	18	12-Feb	37.7317	-74.5433	56.2	BON/CTD, 2B1
10	19	12-Feb	37.8433	-74.5767	54	CTD PROFILE 911, NUT
13	20	12-Feb	37.8783	-74.975	19.6	BON/CTD, 2B3
11	21	12-Feb	37.9983	-74.9567	20.1	CTD PROFILE 911, NUT
14	22	12-Feb	38.1983	-74.5833	39.5	BON/CTD, 2B3
15	23	12-Feb	38.3617	-74.6717	27.3	BON/CTD, 2B3
16	24	12-Feb	38.37	-74.4183	37	BON/CTD, 2B3
17	25	12-Feb	38.8117	-74.5433	19.5	BON/CTD, 2B3
12	25	12-Feb	38.8067	-74.55	20.4	CTD PROFILE 911, NUT
18	26	12-Feb	38.5783	-73.745	55.8	BON/CTD, 2B1
13	26	12-Feb	38.56	-73.7367	56.4	CTD PROFILE 911, NUT
19	27	12-Feb	38.8067	-73.6667	53.4	BON/CTD, 2B3
20	28	12-Feb	38.8617	-73.135	69.5	BON/CTD, 2B3
14	28	12-Feb	38.8567	-73.1433	71.8	CTD PROFILE 911, NUT
15	29	13-Feb	39.0117	-72.585	1000	CTD PROFILE 911, NUT
16	30	13-Feb	39.0533	-72.7417	198	CTD PROFILE 911

Table 1.(continued) Summary of sample activities conducted at 120 stations at which the *PISCES* stopped to

lower instruments over the side during Cruise No. PC 13-01. Latitude and Longitude are shown in decimal degrees. Std BON = 61 cm bongo Standard Protocol, CTD PROFILE 911 = fixed station, 2B3 = 333 mesh 20 cm bongo 2B1 = 165 mesh 20 cm bongo NUT = nutrient samples collected.

CTDCast#	SiteID/STA#	Date GMT	Latitude (dd)	Longitude (dd)	Bottom Depth (meters)	Operation
21	31	13-Feb	39.6233	-72.4583	89	BON/CTD, 2B3
22	32	13-Feb	39.595	-72.3683	95.9	BON/CTD, 2B3
23	33	13-Feb	39.8117	-72.325	76.7	BON/CTD, 2B3
24	34	13-Feb	39.9	-72.5183	60.9	BON/CTD, 2B1
25	35	13-Feb	39.8933	-72.8533	49.2	BON/CTD, 2B3
--	36	13-Feb	39.7798	-72.9545	68.3	Midwater Trawl
17	36	13-Feb	39.805	-73.0367	63.2	CTD PROFILE 911
26	37	13-Feb	39.5767	-73.1633	38	BON/CTD, 2B3
18	37	13-Feb	39.5817	-73.1617	37.1	CTD PROFILE 911
27	38	13-Feb	39.25	-73.05	64.6	BON/CTD, 2B3
28	39	13-Feb	39.1783	-73.2467	56.7	BON/CTD, 2B3
29	41	13-Feb	39.3817	-73.5367	42.3	BON/CTD, 2B3
30	42	14-Feb	39.095	-73.65	45.1	BON/CTD, 2B3
31	43	14-Feb	39.2333	-73.87	33.9	BON/CTD, 2B3
32	44	14-Feb	39.1417	-74.3283	22	BON/CTD, 2B3
33	45	14-Feb	39.2183	-74.1967	22.2	BON/CTD, 2B3
34	46	14-Feb	39.3433	-74.03	22.4	BON/CTD, 2B3
20	47	14-Feb	39.7083	-74.01	17.7	CTD PROFILE 911, NUT
35	48	14-Feb	40	-73.5117	39.8	BON/CTD, 2B3
36	49	14-Feb	40.3317	-73.5	25.5	BON/CTD, 2B1
21	49	14-Feb	40.3317	-73.5083	25.2	CTD PROFILE 911
37	50	14-Feb	40.4117	-72.805	42.3	BON/CTD, 2B1
22	50	14-Feb	40.4117	-72.8017	39.8	CTD PROFILE 911
38	51	14-Feb	40.7583	-72.165	42.6	BON/CTD, 2B3
23	52	14-Feb	40.6517	-72.1983	46.4	CTD PROFILE 911, NUT
--	52	15-Feb	40.6635	-72.1664	46	Midwater Trawl
39	53	15-Feb	40.1133	-71.9683	77.2	BON/CTD, 2B1
40	54	15-Feb	39.9767	-71.2367	320	BON/CTD, 2B3
41	55	15-Feb	40.14	-71.2917	96.8	BON/CTD, 2B3
24	56	15-Feb	40.0367	-70.6017	160.6	CTD PROFILE 911, NUT
--	56	15-Feb	40.0374	-70.6554	157	Midwater Trawl
25	57	15-Feb	39.8333	-70.6183	857	CTD PROFILE 911, NUT
26	58	15-Feb	40.04	-70	144.7	CTD PROFILE 911, NUT
--	58	15-Feb	40.0698	-69.928	132.7	Midwater Trawl
42	59	15-Feb	40.1667	-69.5617	88.4	BON/CTD, 2B1
27	59	15-Feb	40.1633	-69.56	87.2	CTD PROFILE 911, NUT

Table 1.(continued) Summary of sample activities conducted at 120 stations at which the *PISCES* stopped to lower instruments over the side during Cruise No. PC 13-01. Latitude and Longitude are shown in decimal degrees. Std BON = 61 cm bongo Standard Protocol, CTD PROFILE 911 = fixed station, 2B3 = 333 mesh 20 cm bongo 2B1 = 165 mesh 20 cm bongo NUT = nutrient samples collected.

CTDCast#	SiteID/STA#	Date GMT	Latitude (dd)	Longitude (dd)	Bottom Depth (meters)	Operation
43	60	16-Feb	40.0683	-69.0833	164.4	BON/CTD, 2B3
44	61	16-Feb	40.1283	-68.755	161.7	BON/CTD, 2B3
45	62	16-Feb	40.45	-68.2383	113.6	BON/CTD, 2B1
28	63	16-Feb	40.2433	-67.6917	969	CTD PROFILE 911, NUT
29	64	16-Feb	40.3767	-67.69	281	CTD PROFILE 911, NUT
46	65	16-Feb	40.5617	-67.4033	107.6	BON/CTD, 2B3
30	66	16-Feb	40.9283	-67.71	63.5	CTD PROFILE 911, NUT
47	67	16-Feb	40.9783	-67.9933	52	BON/CTD, 2B1
48	68	16-Feb	40.65	-67.8683	81.9	BON/CTD, 2B1
31	68	16-Feb	40.6533	-67.8817	81.2	CTD PROFILE 911, NUT
49	69	16-Feb	40.5833	-68.1417	91.2	BON/CTD, 2B3
50	70	16-Feb	40.8367	-68.71	58.6	BON/CTD, 2B3
51	71	16-Feb	40.9267	-68.5067	44	BON/CTD, 2B3
32	71	16-Feb	40.9267	-68.4983	43	CTD PROFILE 911, NUT
52	72	17-Feb	41.0717	-68.535	50.6	BON/CTD, 2B3
53	73	17-Feb	41.34	-69.4733	34	BON/CTD, 2B3
54	74	17-Feb	41.665	-69.805	30.8	BON/CTD
55	75	19-Feb	42.3583	-70.4567	74	BON/CTD, 2B1
33	75	19-Feb	42.36	-70.4467	80.7	CTD PROFILE 911, NUT
56	76	19-Feb	42.6683	-70.5317	78.9	BON/CTD, 2B3
--	77	19-Feb	42.8672	-70.4444	121.9	Midwater Trawl
34	76	19-Feb	42.6817	-70.5383	71.6	CTD PROFILE 911, NUT
57	78	19-Feb	42.9967	-70.4267	99	BON/CTD, 2B1
35	78	19-Feb	42.995	-70.415	104	CTD PROFILE 911, NUT
58	79	20-Feb	42.8317	-70.0217	153	BON/CTD, 2B3
59	80	20-Feb	43.03	-69.8317	181	BON/CTD, 2B3
60	81	20-Feb	43.0917	-69.2883	172	BON/CTD, 2B3
61	82	20-Feb	43.2033	-68.7483	162	BON/CTD
62	83	20-Feb	43.14	-67.85	192.8	BON/CTD
63	84	20-Feb	43.0333	-67.7017	170	BON/CTD
64	85	20-Feb	43.4	-67.7	240	BON/CTD, 2B1
65	85	20-Feb	43.385	-67.71	241	CTD PROFILE 19/19+

Table 1.(continued) Summary of sample activities conducted at 120 stations at which the *PISCES* stopped to lower instruments over the side during Cruise No. PC 13-01. Latitude and Longitude are shown in decimal degrees. Std BON = 61 cm bongo Standard Protocol, CTD PROFILE 911 = fixed station, 2B3 = 333 mesh 20 cm bongo 2B1 = 165 mesh 20 cm bongo NUT = nutrient samples collected.

CTDCast#	SiteID/STA#	Date GMT	Latitude (dd)	Longitude (dd)	Bottom Depth (meters)	Operation
66	86	20-Feb	43.5333	-68.0617	195.1	BON/CTD, 2B3
67	87	20-Feb	43.6433	-68.345	181	BON/CTD, 2B3
68	88	20-Feb	43.77	-68.67	114.3	BON/CTD, 2B1
36	88	20-Feb	43.765	-68.6883	88	CTD PROFILE 911, NUT
69	89	20-Feb	43.75	-69.1917	90	BON/CTD, 2B3
37	89	20-Feb	43.745	-69.1967	103	CTD PROFILE 911, NUT
70	90	21-Feb	43.6933	-69.6867	72.4	BON/CTD, 2B3
71	92	23-Feb	42.505	-69.6717	236	BON/CTD, 2B1
38	92	23-Feb	42.5083	-69.6633	234	CTD PROFILE 911, NUT
72	93	23-Feb	42.0033	-68.4183	171.2	BON/CTD, 2B1
73	94	23-Feb	41.9017	-68.185	195.4	BON/CTD, 2B3
74	95	23-Feb	41.8717	-67.8433	32	BON/CTD, 2B1
75	96	23-Feb	41.76	-68.1433	46.8	BON/CTD, 2B1
76	97	23-Feb	41.6667	-68.495	162.2	BON/CTD, 2B3
77	98	23-Feb	41.4717	-68.25	46.7	BON/CTD, 2B3
39	98	23-Feb	41.4783	-68.2433	46	CTD PROFILE 911, NUT
78	99	23-Feb	41.4117	-68.0967	35	BON/CTD, 2B3
40	100	23-Feb	41.4667	-67.6883	39	CTD PROFILE 911, NUT
79	101	23-Feb	41.2267	-67.6117	35.9	BON/CTD, 2B3
41	102	23-Feb	40.8283	-68.8333	67.5	CTD PROFILE 911, NUT
80	102	24-Feb	40.85	-68.8217	71	BON/CTD, 2B3
--	102	24-Feb	40.8607	-68.849	62.8	Midwater Trawl
42	103	24-Feb	40.8867	-69.1517	63	CTD PROFILE 911, NUT
81	104	24-Feb	40.5983	-69.2383	55	BON/CTD, 2B3
82	105	24-Feb	40.4367	-69.2117	76.1	BON/CTD, 2B3
83	106	24-Feb	40.49	-69.395	61	BON/CTD, 2B3
84	107	24-Feb	40.73	-69.6767	43.1	BON/CTD, 2B3
43	108	24-Feb	41.0967	-70.6217	42.1	CTD PROFILE 911, NUT
85	109	24-Feb	41.1583	-70.635	38.9	BON/CTD, 2B3
86	110	24-Feb	41.295	-71.1033	33	BON/CTD, 2B3
44	111	24-Feb	41.5133	-71.355	23.8	CTD PROFILE 911, NUT
87	112	25-Feb	41.3033	-71.2683	34.9	BON/CTD, 2B3

Table 1.(continued) Summary of sample activities conducted at 120 stations at which the *PISCES* stopped to lower instruments over the side during Cruise No. PC 13-01. Latitude and Longitude are shown in decimal degrees. Std

BON = 61 cm bongo Standard Protocol, CTD PROFILE 911 = fixed station, 2B3 = 333 mesh 20 cm bongo 2B1 = 165 mesh 20 cm bongo NUT = nutrient samples collected.

CTDCast#	SiteID/STA#	Date GMT	Latitude (dd)	Longitude (dd)	Bottom Depth (meters)	Operation
45	112	25-Feb	41.305	-71.275	32.1	CTD PROFILE 911, NUT
88	113	25-Feb	41.0083	-71.2817	42	BON/CTD, 2B3
46	113	25-Feb	41.015	-71.2933	41.4	CTD PROFILE 911, NUT
89	114	25-Feb	40.8633	-71.5617	54.9	BON/CTD, 2B3
--	114	25-Feb	40.8856	-71.4734	53.2	Midwater Trawl
47	115	25-Feb	40.6417	-71.4317	58	CTD PROFILE 911, NUT
90	116	26-Feb	40.445	-71.3667	67.9	BON/CTD, 2B3
91	117	26-Feb	40.5083	-71.2083	70.2	BON/CTD, 2B3
92	118	26-Feb	40.4467	-70.65	72.7	BON/CTD, 2B3
48	119	26-Feb	40.6683	-70.6233	55.6	CTD PROFILE 911, NUT
93	120	26-Feb	40.875	-70.6267	49.7	BON/CTD, 2B3

TOTALS:	Std/BON/CTD Casts	= 92
	2B3 Bongo Casts	= 66
	2B1 Bongo Casts	= 21
	CTD PROFILE 911 Casts	= 46
	Vertical CTD 19 Profile	= 1
	Casts collecting Nutrients	= 40
	Midwater Trawls	= 7

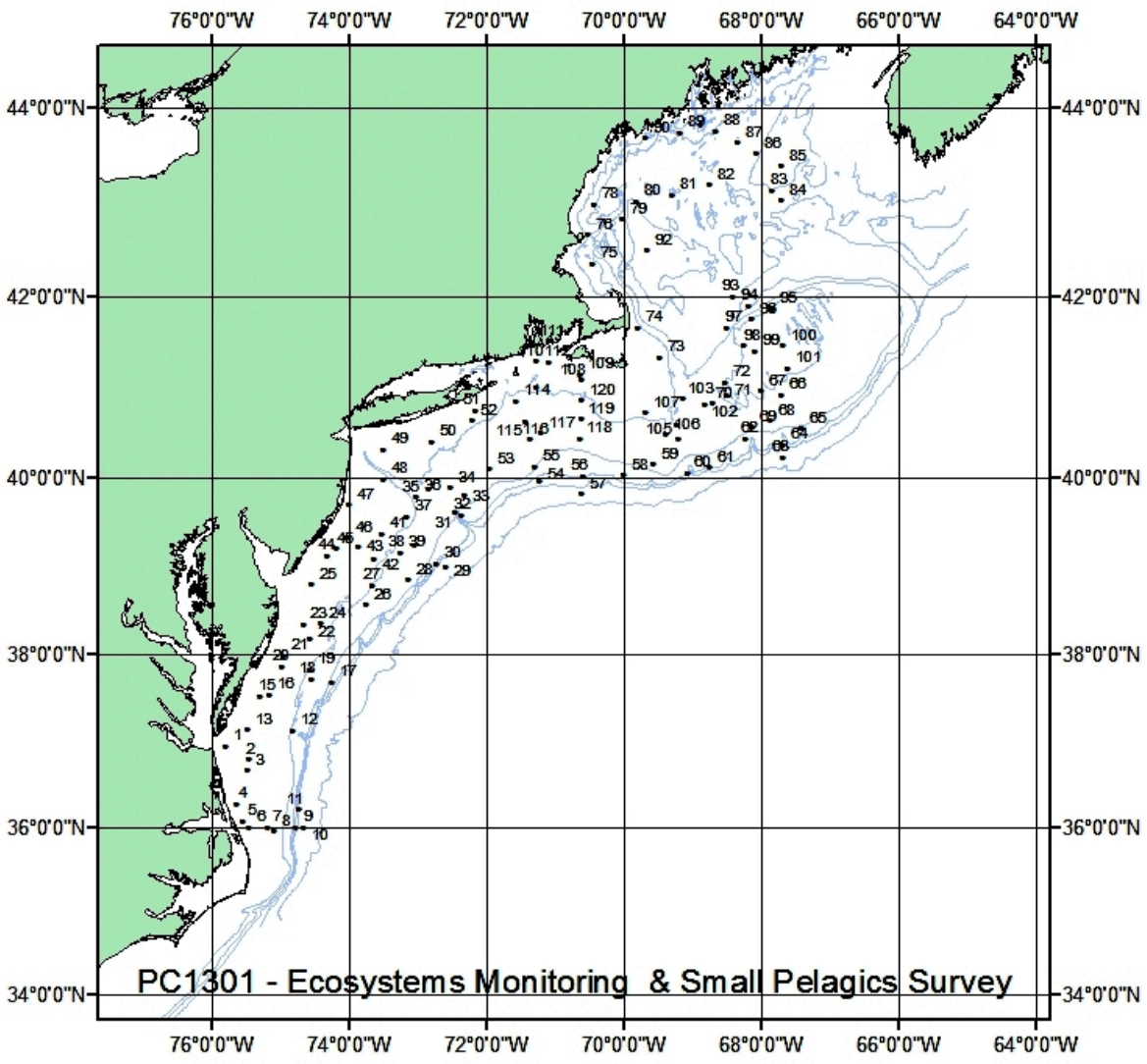

Figure 1. Station locations numbered consecutively for Winter Northeast Integrated Pelagic Survey PC 13-01, 10 – 26 February, 2013.

Figure 2. Retrieval of Niskin bottle rosette water sampler with CTD 911 and styrofoam cups from Fishing Cove Elementary School students, onto the side sampling station of the *PISCES*.

Figure 3. Styrofoam coffee cups decorated by elementary school Students from Fishing Cove School in North Kingstown, RI. The cups show considerable shrinkage after submersion on the CTD 911 rosette.

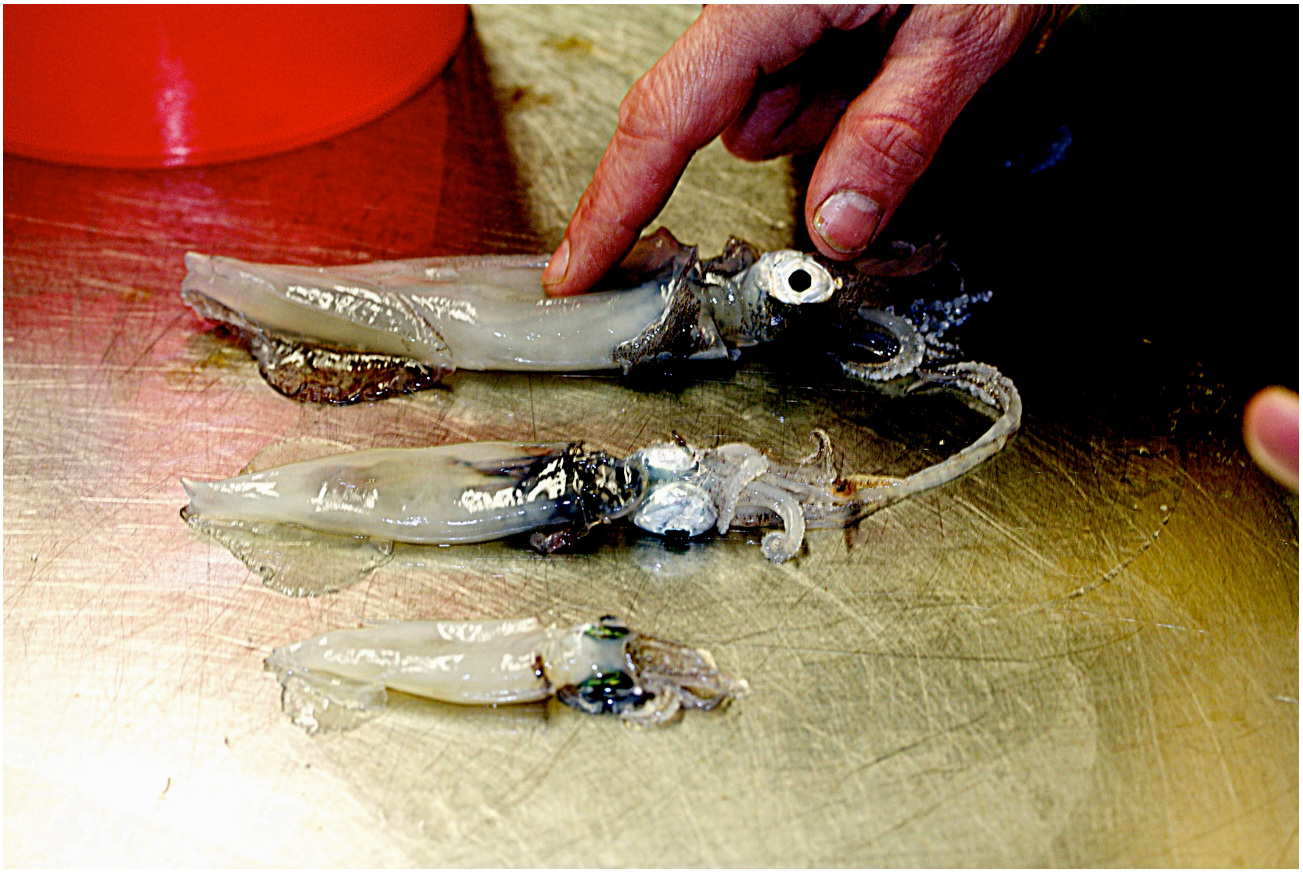

Figure 4. Squid caught by the mid-water trawl on the PC 13-01 Survey.

Figure 5. Small pelagic adult and juvenile fish caught in the mid-water trawl during the PC 13-01 Survey.

Figure 6. Michael Jech holding 38 mm diameter tungsten carbide sphere used to calibrate EK60 acoustic system on *PISCES*.